WHAT IS CLAIMED IS:

1). A plurality of unleaded fuels boiling in the gasoline range for use in spark ignition, internal combustion engine having a CR of 11 or more comprising:

at least a first fuel and a second fuel,

the first fuel having a RON greater than 100, and at high load conditions an average burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane;

the second fuel operative in said engine.

2). A plurality of unleaded fuels boiling in the gasoline range for use in a spark ignition, internal combustion engine having a CR of 11 or more comprising:

at least a first fuel operative in said engine, and a second fuel,

the second fuel having a RON less than 90, and at low load conditions a burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane.

3). A plurality of unleaded fuels boiling in the gasoline range for use in operating a spark ignition, internal combustion engine having a CR of 11 or more comprising:

at least a first fuel and a second fuel,

the first fuel having a RON greater than 100, and at high load conditions an average burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane;

the second fuel having a RON less than 90, and at low load conditions a burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane.

4). The fuels of claim 1 including at least a third fuel having a RON between those of the first and second fuel, and at medium load conditions a burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane.

5.) The fuels of claim 4 wherein the third fuel is admixed from the first and second fuel.

6.) The fuels of claim 5 wherein the admixture functions to allow engine operation at or about MBT.

7.) The fuels of claim 4 wherein the third fuel functions to allow engine operation at or about MBT.

8). At least two unleaded fuel compositions for use in operating a spark ignition, internal combustion engine having a CR of 11 or more comprising at least a first fuel and a second fuel boiling in the gasoline range,
the first fuel having a RON greater than 100 and greater than 45 vol. aromatics, the second fuel having a RON and aromatics less than the first fuel.

9). The fuel compositions of claim 8 wherein said first fuel has greater than about 55% aromatics.

10). The fuel composition of claim 9 wherein said first fuel has about 60% aromatics.

11). The fuel compositions of claim 3 wherein the compositions include sulfur compounds and wherein the total sulfur content fuel delivered to the vehicle is less than 50 PPM.

12). The fuel composition of claim 11 wherein the concentration of sulfur in the low RON fuel is lower than the concentration of sulfur in the high octane fuel.

13). A fuel system for spark ignition engines having a CR of 11 or more, comprising:

at least a first fuel and a second fuel;

the first fuel having a RON greater than 100, a burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane;

means for injecting the first fuel into the engine for combustion therein in response to at least a first predetermined engine operating condition;

a second fuel having a RON less than 90, a burn rate greater than 105% of isooctane and a laminar flame speed greater 105% of isooctane; and

means for injecting the second fuel into the engine for combustion therein in response to at least a second predetermined engine operating condition.

14). The fuel system of claim 13 including at least a third fuel having a RON between that of the first and second fuel, further characterized as having a burn rate and flame speed greater than 105% of isooctane.

15.) The fuel system of claim 14 wherein the third fuel is admixed from the first and second fuel.

16.) The fuel system of claim 15 wherein the admixture functions to allow engine operation at or about MBT.

17.) The fuel system of claim 14 wherein the third fuel functions to allow engine operation at or about MBT.

18). A method for operating spark ignition, internal combustion engine having a CR of 11 or more comprising:

combusting a first fuel having a RON greater than 100,a burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane under high load conditions;

and combusting a second fuel having a RON less than 90, a burn rate of greater than 105% isooctane and a laminar flame speed greater than 105% isooctane under low load conditions.

19). The method of claim 18 having the additional step of combusting a third fuel under moderate load conditions wherein said third fuel has a RON between that of the first and second fuel and further characterized as having a burn rate and flame speed greater than 105% of isooctane.

20.) The method of claim 19 wherein the third fuel is admixed from the first and second fuel.

21.) The method of claim 20 wherein the admixture functions to allow engine operation at or about MBT.

22.) The method of claim 19 wherein the third fuel functions to allow engine operation at or about MBT.

23). A method for operating a vehicle having a spark ignition engine to increase the efficiency and reduce the emissions of the engine under conditions of use comprising:

supplying a first fuel to the engine at about high engine load conditions; and

supplying a second fuel to the engine at about low engine load conditions,

the first fuel having a RON greater than 100, a burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane;

the second fuel having a RON less than 90, a burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane; and

whereby engine efficiency is increased and emissions are reduced.

24). The method of claim 23 wherein said engine is a direct injection, stratified charge engine.

25. The method of claim 23 wherein said engine is a port fuel injected, stratified charge engine.

26). The method of claim 23 having an additional step of supplying a third fuel to the engine at about moderate load levels, said third fuel having a RON less than about 100 and greater than about 90.

27.) The method of claim 26 wherein the third fuel is admixed from the first and second fuel.

28.) The method of claim 27 wherein the admixture functions to allow engine operation at or about MBT.

29.) The method of claim 26 wherein the third fuel functions to allow engine operation at or about MBT.

30). A fuel system for spark ignited engines that operate under high exhaust gas recycle during low to moderate engine load conditions the system comprising:

means for supplying to the engine a first fuel during high load conditions; and

means for supplying to the engine a second fuel during low load conditions;

the first fuel having a RON greater than 100, a burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane;

the second fuel having a RON less than 90, a burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane; and

whereby engine efficiency is increased and emissions are reduced.

31). The method of claim 30 further including means for supplying to the engine a third fuel during moderate load conditions, said fuel having a RON greater than about 90 and less than about 100, a burn rate and flame speed greater than about 105% of isooctane.

32.) The method of claim 31 wherein the third fuel is admixed from the first and second fuel.

33.) The method of claim 32 wherein the admixture functions to allow engine operation at or about MBT.

34.) The method of claim 31 wherein the third fuel functions to allow engine operation at or about MBT.

35). In a vehicle having spark ignition engine, the improvement wherein the engine has a CR of 11 or more;

wherein at least a first fuel and a second fuel are available on the vehicle for combustion by the engine, the first fuel having a RON greater than 100, and under high load conditions a burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane, and the second fuel having a RON less than 90, and under low load conditions a burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane; and

wherein the first fuel is supplied to the engine when operating under high load conditions and the second fuel is supplied to the engine when operating under low load conditions.

36). The vehicle of claim 35 wherein a third fuel is available on the vehicle and is supplied to the engine thereof, said fuel having a RON greater than about 90 and less than about 100, and a burn rate and flame speed greater than about 105% of isooctane.

37.) The vehicle of claim 36 wherein the third fuel is admixed from the first and second fuel.

38.) The vehicle of claim 37 wherein the admixture functions to allow engine operation at or about MBT.

39.) The vehicle of claim 36 wherein the third fuel functions to allow engine operation at or about MBT.

40). A method of operating an internal combustion engine having a CR of 11 or more, the method comprising:

providing a plurality of fuels of different and predetermined combustion properties, each fuel selected to improve engine performance under preselected operating conditions; and

supplying the selected fuel to the engine when operating at the preselected condition.

41). A method of reducing emissions and increasing efficiency of a spark ignition internal combustion engine having a CR of 11 or more, the method comprising:

providing a plurality of fuels of different and predetermined combustion properties, each fuel selected to improve engine performance under preselected operating conditions; and

supplying the selected fuel to the engine when operating at the preselected condition.

42) A fuel system for spark ignition engines having a CR of 11 or more, comprising:

at least a first fuel and a second fuel;

the first fuel having a RON set at the minimum required to allow operating the engine at MBT when at wide open throttle at the rpm setting for maximum power,

a burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane;

means for injecting the first fuel into the port or engine for combustion therein in response to at least a first predetermined engine operating condition;

a second fuel having a RON less than 90, a burn rate greater than 105% of isooctane and a laminar flame speed greater than 105% of isooctane; and

means for injecting the second fuel into the port or engine for combustion therein in response to at least a second predetermined engine operating condition.

43). The fuel system of claim 42 further comprising a third fuel having a RON greater than about 90 and less than about 100, and a burn rate and flame speed greater than about 105% of isooctane.

44.) The fuel system of claim 43 wherein the third fuel is admixed from the first and second fuel.

45.) The fuel system of claim 44 wherein the admixture functions to allow engine operation at or about MBT.

46.) The fuel system of claim 43 wherein the third fuel functions to allow engine operation at or about MBT.